

**Hylebos Waterway
Wood Debris Program**

Cleanup Action Plan



**Prepared for the
Hylebos Wood Debris Group**

**Prepared by
Floyd & Snider Inc.
Pentec Environmental, Inc.
Evans-Hamilton, Inc.
Shenk & Associates, LLC**

October 2000

FINAL

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Attn: Kris Flint

Date: 10/13/00

Re: Hylebos Wood Debris Program

We are sending the following items:

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The Consent Decree and Cleanup Action Plan for the Wood Debris Cleanup have gone through public comment and been accepted without change. The Cover and footer have been changed to reflect that this is now a final document. The attached copy is for the administrative record; please let us know if you need an additional copy for your personal files.

Thank you so much for your involvement on this project! Now onto permitting and construction!

Sincerely,

Teri A. Floyd, Ph.D.
WDG Project Manager

Steve Reimers, P.E.
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List of Acronyms

Acronym	Definition
AO	Agreed Order on Consent
BMPs	Best management practices
CAD	Confined aquatic disposal
CADR	Cleanup Action Design Report
CAP	Cleanup Action Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMP	Compliance Monitoring Plan
CSL	Cleanup Screening Level
CSR	Cleanup Study Report
DMMU	Dredged materials management units
Ecology	Washington State Department of Ecology
ECUTB	East Central Upper Turning Basin
EFs	Exceedance factors
FSI	Floyd & Snider Inc.
HCC	Hylebos Cleanup Committee
HPAHs	High molecular weight polycyclic aromatic hydrocarbons
HWDS	Hylebos Wood Debris Site
LPAHs	Low molecular weight polycyclic aromatic hydrocarbons
MCUL	Maximum Cleanup Level
ML	Maximum Level
MLLW	Mean lower low water
MTCA	Model Toxic Control Act
NEBA	Net Environmental Benefit Analysis

List of Acronyms

Acronym	Definition
OMMP	Operation, Maintenance, and Monitoring Plan
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PSDDA	Puget Sound Dredged Disposal Analysis Authority
PSDDA ML	Puget Sound Dredged Disposal Authority Maximum Level
ROD	Record of Decision
SMS	Sediment Management Standards
SQO	Sediment Quality Objectives
SQS	Sediment Quality Standard
TVS	Total volatile solids
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UTB	Upper Turning Basin
WAC	Washington Administrative Code
WDG	Wood Debris Group

1.0 Introduction

This Cleanup Action Plan (CAP) documents plans by the Hylebos Wood Debris Group (WDG) to address wood debris accumulations in the Hylebos Wood Debris Site (HWDS). The WDG, whose members include Manke Lumber Company, Louisiana-Pacific Corporation, and Weyerhaeuser Company, operates facilities on the Hylebos Waterway in Tacoma, Washington (Figure 1.1). The activities are being performed in compliance with the Washington Sediment Management Standards (SMS) (Ecology, 1995; WAC Chapter 173-204) and the Model Toxics Control Act (MTCA) (Ecology, 1996; WAC Chapter 173-340), pursuant to the terms of a Consent Decree (CD) between the Washington State Department of Ecology (Ecology) and the WDG (Ecology, 1999). The work to be performed is generally consistent with the United States Environmental Protection Agency's (USEPA's) September 9, 1989 Record of Decision (ROD) for the Commencement Bay Nearshore/Tideflats Superfund Site (USEPA, 1989). It is also consistent with the overall Hylebos Waterway cleanup plan¹ and USEPA's Draft Explanations of Significant Differences (USEPA, 1997, 1999).

The WDG performed a Cleanup Study² in the HWDS. The goals of the study were to:

- Gather information on wood debris and sediment distribution within the HWDS.
- Delineate areas with accumulations of wood debris.
- Identify areas where it was appropriate to remove chemically contaminated sediment.
- Assess options to remove accumulated wood debris and selected chemically impacted sediment.
- Select preferred cleanup alternatives.

A detailed description of site investigation results and site alternatives is presented in the Hylebos Waterway Wood Debris Program Cleanup Study Report (CSR) (Floyd & Snider Inc. [FSI], 2000a).

The alternative chosen for the HWDS removes wood debris accumulations from the shipping channel and adjacent subtidal and intertidal areas, consistent with continued use of the Hylebos Waterway as a shipping channel. It specifically addresses removal of wood debris and selected chemically contaminated sediment present in the Upper Turning Basin (UTB) area of the HWDS. The selected alternative also provides for future operations, maintenance, and monitoring of activities in the HWDS, as described in the Operations, Maintenance and Monitoring Plan (OMMP) (FSI, 2000b).

1 The Hylebos Waterway cleanup plan is being developed under USEPA's 1993 Administrative Order on Consent with the Hylebos Cleanup Committee (HCC) [USEPA, 1993].

2 A Cleanup Study is the SMS-equivalent of a MTCA Remedial Investigation and Feasibility Study (RI/FS). The WDG Cleanup Study was performed pursuant to an Agreed Order (AO) between Ecology and the WDG (Ecology, 1997).

This CAP was prepared to comply with Ecology's processes under MTCA and SMS. In particular, the objectives of the CAP are to:

- Describe the HWDS, by providing a summary of its history and the nature and extent of wood debris accumulations and chemical contamination, as described in detail in the CSR.
- Identify site-specific cleanup standards or approaches.
- Summarize the alternatives presented in the CSR.
- Identify and describe the Ecology-selected alternative for wood debris and sediment removal activities.

2.0 Site Background and Setting

2.1 SITE LOCATION AND DESCRIPTION

The Hylebos Wood Debris Site (HWDS) is located at the southeastern end or head of the Hylebos Waterway. The Hylebos Waterway opens onto Commencement Bay in Tacoma, Washington (Figure 1.1). The site begins at the U.S. Army Corps of Engineer's (USACE's) Channel Station 130+00 and consists of the "Neck" located between the Upper and Lower Turning Basins, and the Upper Turning Basin (UTB) (Figure 2.1). The Neck and UTB are further divided into subtidal and intertidal units, as described in the following sections. The HWDS overlaps the study area under investigation by the HCC as part of its Administrative Order on Consent under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) with USEPA.

2.1.1 SUBTIDAL UNIT

Subtidal sediment is defined as the sediment located below the zero mean lower low water (0 feet MLLW) line in the waterway. The subtidal unit is present throughout the Neck and UTB, and contains the navigation channel.

2.1.2 INTERTIDAL UNITS

Intertidal sediment is defined as the sediment located between 0 feet MLLW and approximately +12 feet MLLW. The intertidal units were further divided by the WDG into two groups:

- **Intertidal sediment owned by members of the WDG.** The Manke Lumber, Louisiana-Pacific, and Weyerhaeuser intertidal units are defined as the intertidal sediment located within an area delineated by extending the property lines from the upland property to the pierhead line. Cleanup actions on these properties may be driven by either wood debris accumulations or chemical contamination or both. All activities in these areas will be supervised by the WDG members.
- **Intertidal sediment not owned by WDG members.** The sediment is located adjacent to other properties within the HWDS and is assumed to be owned by the adjacent uplands property owner. WDG cleanup in these areas will be limited to accumulations of nonchemically contaminated wood debris.

2.2 HISTORY, OWNERSHIP, AND LAND USE

The Hylebos Waterway is a man-made navigation channel (Figure 1.1). The HWDS is within an extension of the original Hylebos Waterway that was dredged into Puyallup River deltaic silts and sands in the mid-1960s to create the UTB. The UTB was originally dredged to be between approximately 30 and 32-feet deep, 1,800 feet (0.3 miles) long, and 700 feet wide.

The navigation channel within the waterway is dredged and maintained by the USACE. The authorized navigation channel depth is -30 feet MLLW, with a 2-foot over-dredging allowance. Some upland property owners within the HWDS have dredged ship berthing areas adjacent to their properties that are deeper than -30 feet MLLW.

The Port of Tacoma owns the property underlying the Hylebos Waterway except for the areas on the shore side of the pierhead line (Figure 2.1). Throughout the waterway, ownership of upland property extends to the pierhead line.

Upland portions of the HWDS are zoned for industrial activity. Virtually all of the upland properties in the head of the waterway have been used exclusively for industrial purposes since their development in the 1960s. Table 2.1 summarizes land use in upland areas bordering the HWDS.

Commercial towing and shipping activities have occurred in the HWDS since its initial dredging. Ships and barges using the HWDS include those servicing facilities within the HWDS and those using the UTB to turn around before exiting the waterway. All large ships must use the UTB to turn around before exiting. Additionally, log rafts have been transported and stored within the HWDS since its creation.

3.0 Site Characterization

This section presents a brief summary of environmental investigations that have been performed in the Hylebos Waterway that included evaluation of sediment within the HWDS. The investigations summarized herein include those performed by parties other than the WDG prior to 1991 (Previous Investigations), investigations performed by parties other than the WDG between 1991 and the present (Concurrent Investigations), and the HWDS Cleanup Study undertaken during 1997 and 1998 by the WDG.

3.1 PREVIOUS AND CONCURRENT INVESTIGATIONS

Over the past 15 years, investigations of widely varied scope have been conducted to evaluate sediment conditions in the Hylebos Waterway. Some investigations were performed by upland property owners to evaluate the sediment adjacent to a specific property. Others evaluated the sediment within the entire waterway. Table 3.1 summarizes investigations performed and data available from previous and concurrent investigation activities. Figures 3.1 and 3.2 present station locations within and adjacent to the HWDS during previous and concurrent investigations, respectively.

At least 11 separate investigations have focused on identifying impacts of industrial operations on the HWDS. These have included studies of subtidal and intertidal sediment, benthic populations, fish histopathology, bioaccumulation, and the presence of contaminants such as metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), pesticides, and volatile and semi-volatile organic compounds. Some of these studies are still in progress.

The results of these investigations indicate that the concentrations of chemical contaminants in sediment in the Neck and the UTB differ significantly. Sediment in the UTB has few exceedances of chemical criteria (ROD Sediment Quality Objectives) at the surface or at depth. Sediment within the Neck typically contains PCBs and PAHs at concentrations exceeding applicable chemical criteria. Many of the subsurface samples with significant exceedances are shallow (zero to one foot deep) indicating that contamination is near the surface.

Exceedances of bioassay criteria occur in both the Neck and the UTB. All of the Neck stations with biological exceedances also contain chemical exceedances. In the UTB, biological effects were noted in several areas where chemical exceedances were not apparent. Under both SMS and the ROD, biological endpoints are used to designate cleanup areas, particularly in locations where adverse impacts may occur because of chemicals or other factors not accounted for under the chemical lists for both the ROD and SMS.

3.2 HYLEBOS WATERWAY WOOD DEBRIS PROGRAM INVESTIGATIONS

In response to concerns that log handling activities may have impacted benthic populations in the waterway, the WDG voluntarily entered into an agreement with Ecology which provided for a focused investigation into the nature and extent, and potential impacts of wood debris in the

HWDS. This investigation and assessment program is referred to as the Hylebos Waterway Wood Debris Program.

3.2.1 THE NATURE AND EXTENT OF WOOD DEBRIS

The WDG investigated the nature and extent of wood debris in the HWDS in a series of investigations presented in the Hylebos Waterway Cleanup Study Report (FSI, 2000a), and in a subsequent Pilot Study as part of pre-remedial design (FSI, 1999a; Appendix A). Key findings of the WDG investigations into the nature and extent of wood debris include the following:

- Areas of high wood debris accumulation (greater than 75 percent cover and greater than 60 percent by volume) generally occur immediately adjacent to transfer facilities. These areas represent about 15 percent of the total area of the HWDS.
- Approximately 40 percent of subtidal and intertidal areas have no measurable wood debris and an additional 30 percent of subtidal and intertidal areas have less than 20 percent wood debris (by either coverage or volume).
- Three wood debris size fractions were evaluated for HWDS sediment samples and the dominant size fraction was identified. The percentages of stations in each fraction were as follows: less than 0.25-inch, 10 percent; 0.25-inch to 3 inches, 80 percent; greater than 3 inches, 10 percent. (FSI, 2000a).
- Accumulations of wood debris in intertidal areas were generally limited to two locations. The first was a small area adjacent to Weyerhaeuser's log transfer facility. The second was the Manke shoreline extending west from their mechanical log lift, past the log slide towards the Tacoma Boat property.
- Randomly-located single logs (with occasional log bundles) were found adjacent to log transfer facilities. The number of logs diminishes with increased distance from the transfer locations. The relative density of logs is medium-to-high near transfer areas. Individual logs are present at a relatively low density outside of log transfer and handling areas.
- The long, thin shape of the Hylebos Waterway has profound effects on water circulation in the HWDS.
- Ship-induced currents (ship scour) in the HWDS are strong enough to move and re-suspend sediment and wood debris.
- The benthic community structure in the HWDS is strongly influenced by the circulation pattern and its effect on dissolved oxygen and by disturbances caused by ship scour. The benthic community is influenced by areas with high wood accumulations (i.e., sufficient to smother the sediment and change the physical substrate).
- The measures of wood debris do not correlate with amphipod or sediment larval bioassay results.
- The only statistically significant correlations between bioassay test results and wood debris were an increase in polychaete growth rates with increasing wood volume and a decrease in polychaete growth rates with increasing wood cover.

3.2.2 THE NATURE AND EXTENT OF CHEMICAL CONTAMINATION

As part of the Puget Sound Dredge Disposal Authority (PSDDA) disposal suitability determination, the WDG collected an extensive suite of chemical data within the UTB. This sampling event is the single most representative sampling of chemical contamination within the WDG cleanup areas. The WDG cleanup areas in the UTB were divided into 35 PSDDA dredged material management units (DMMUs) of approximately 4,000 cubic yards each (Figure 3.3). PSDDA cores representing the thickness of the dredge prism were collected from each unit and tested for all PSDDA chemicals in accordance with the PSDDA Sampling and Analysis Plan (Pentec Environmental, Inc. [Pentec] and FSI, 1999). These results are in close agreement to the results obtained in the other studies in the UTB, but represent a more uniform distribution across both the areal and vertical extent of the cleanup areas.

The chemical concentrations were compared to the USEPA chemical cleanup levels for the Hylebos Waterway (these levels are called sediment quality objectives or SQOs). For ease in assessing the data, exceedance factors (EFs) were calculated, where the exceedance factor is defined as the measured concentration divided by the SQO. An EF of less than 1.0 indicates that the SQO was not exceeded, while a value of greater than 1.0 indicates that an exceedance has occurred. The larger the EF, the greater the exceedance.

The average, minimum, and maximum EFs for each detected chemical are plotted in Figure 3.4. For metals and PCBs, the thin line represents the range of EFs for that chemical, and the square symbol represents the average value. For PAHs, the concentrations for a single station, A7, are plotted as diamonds with the thin line representing the range from lowest to highest, excepting A7. Average concentrations for PAHs include concentrations at Station A7. Station A7 is located approximately 100 feet offshore from the Manke Lumber Company, at the toe of the slope in non-native materials (Figure 3.3).

All metal concentrations, except for arsenic and zinc, are less than the SQO. Arsenic and zinc concentrations are elevated in two well defined areas adjacent to historical sources of sand blast grit: at the toe of slope in front of the historical J&G ship building facility and in the nearshore subtidal sediment near the historical Tacoma Boat facility. Even with these two "hot spots," average arsenic and zinc concentrations in the UTB are considerably less than the SQO.

Low levels of PCBs and PAHs were detected in the majority of the PSDDA samples; all concentrations were less than two times the SQO (except for a single station, A7) and the average concentrations were generally less than half the SQO. The relatively low concentrations of PAHs and PCBs and their prevalence in depositional areas is consistent with their migration into the UTB from sources in the Neck and lower turning basin as discussed in the CSR (FSI, 2000a) and the Commencement Bay/Nearshore Tideflats Remedial Investigation (Tetra Tech, 1985).

In summary, chemical contamination in the UTB is minimal, with concentrations rarely exceeding the SQOs. This situation differs from other areas of the Hylebos Waterway, including the Neck, where concentrations have been measured at five to 20 times the SQOs. In the UTB, two arsenic "hot spots" in subtidal areas near historical sources exist and will be addressed. Otherwise,

average low molecular weight PAHs (LPAHs) are generally about a quarter of the SQO, while average high molecular weight PAHs (HPAHs) and PCBs are generally about half the SQO.

4.0 Identification of Cleanup Standards and Cleanup Areas

4.1 CLEANUP AREA EVALUATION CRITERIA

4.1.1 THE INTERACTION BETWEEN THE HYLEBOS WOOD DEBRIS SITE AND CERCLA ACTIVITIES

Prior studies determined that sediment in the HWDS is contaminated with various chemical substances. Although the WDG has taken the lead role in the present study, cleanup of chemically impacted sediment will largely be undertaken by other parties because members of the WDG are not responsible for releases of these chemicals. Specifically, both the Agreed Order (AO) and the CD between the WDG and Ecology specify that the WDG is not responsible for the cleanup of sediment with chemical concentrations greater than the Puget Sound Dredged Disposal Analysis Maximum Level (PSDDA ML) and/or PCB concentrations greater than 300 $\mu\text{g/kg}$. Responsibility for areas with chemical contamination exceeding these criteria passes back to Ecology and USEPA, who will coordinate cleanup as part of the CERCLA process.

The WDG identified areas with PSDDA ML exceedances and areas where PCB concentrations exceed 300 $\mu\text{g/kg}$ within the Neck and the UTB. Consistent with the WDG AO and CD, the WDG is not responsible for the cleanup of sediment or wood debris contaminated by non-wood related chemicals with concentrations exceeding these criteria. This exclusion has resulted in a return of the Neck area to the Agencies, with the exception of a small intertidal area near Weyerhaeuser which appears to contain uncontaminated wood debris.

4.1.2 REGULATORY FRAMEWORK FOR IDENTIFYING CLEANUP AREAS

The WDG AO and CD establish Ecology as the lead agency responsible for selecting site-specific cleanup approaches, cleanup areas, and cleanup actions for the HWDS. The standard Ecology Sediment Management Standards/Model Toxics Control Act (SMS/MTCA) framework was used to designate wood debris removal areas subject to the following clarifications:

The chemical criteria used to identify areas that may require cleanup due to chemical exceedances were the Sediment Quality Objectives (SQOs) developed as part of the Commencement Bay Nearshore/Tideflats ROD. These criteria were used because of the USEPA's desire to have consistent chemical criteria throughout the waterway. Ecology has determined that these criteria are appropriate and applicable to the HWDS and may be used in place of the SMS chemical criteria.

The biological criteria, used to identify areas that may require cleanup based on biological exceedances, are those specified in Washington's SMS (WAC 173-204). Ecology and USEPA believe that the biological criteria under the SMS are consistent with the intent of the biological criteria under the Commencement Bay Nearshore/Tideflats ROD.

Site-specific wood screening levels were established to facilitate wood debris removal and post-cleanup monitoring decisions (Section 4.4).

4.1.3 CHEMICAL CRITERIA FOR IDENTIFYING CLEANUP AREAS

All chemical data were compared to the ROD SQO criteria to identify and develop cleanup areas. According to the ROD, biological passes in these areas can override chemical exceedances, resulting in the decision that no cleanup is required. The one exception to the ROD SQO criteria at the HWDS is for PCBs, where the standard is based on protection of human health and biological testing is not relevant.

4.1.4 BIOLOGICAL CRITERIA FOR IDENTIFYING CLEANUP AREAS

Consistent with SMS, bioassay testing was used to evaluate biological criteria in defining cleanup areas. Stations with Cleanup Screening Level (CSL) and Minimum Cleanup Level (MCUL) failures were identified as cleanup areas, with the following exception: HCC Station 1133 contained a MCUL bioassay failure with no associated wood screening level or chemical SQO exceedances. However, the WDG placed Station HOW-B04 within 60 feet of 1133, in an area that also contains wood debris, and tested the station in 1998. All three bioassay tests passed. Based on the passing bioassays in 1998 and the absence of an apparent stressor at 1133, the area defined by HOW-B04 and 1133 is considered clean.

There are a few stations in the HWDS where biological testing shows Sediment Quality Standard (SQS) level failures without an apparent stressor. At these stations, the chemical concentrations are less than SQO levels, little or no wood is present, sulfide and ammonia concentrations are low, and dissolved oxygen levels at the sediment surface (as determined by relative percent difference) are acceptable. Nevertheless, the WDG identified these stations as stations with biological criteria exceedances, and the information has been used to develop cleanup areas, as discussed in Section 4.2.5.

Because biological testing results override chemical testing results, those areas with chemical SQO exceedances, but with biological passes, were eliminated as potential cleanup areas.

4.1.5 WOOD SCREENING LEVEL FOR IDENTIFYING CLEANUP AREAS

Existing regulatory programs have no cleanup criterion for wood debris. Therefore the determination of whether wood debris at a given location requires removal was made using a site-specific weight-of-evidence evaluation, rather than a simple numeric or narrative standard.

Wood debris cleanup decisions were made using a two-tiered approach. In Tier 1, information about the volumetric amount of wood present and the percentage of wood coverage was used to distinguish between the following three levels of wood debris zones:

- High wood debris accumulation areas were identified as those areas with wood debris covering 75 percent or greater of the sediment surface and with a total volatile solids (TVS) content of 40 percent or greater. A TVS of 40 percent corresponds, in the HWDS, to approximately 60 percent wood debris by volume or 30 percent by

weight. These areas are identified as cleanup areas based on wood debris accumulation. Some of these areas may also be identified as cleanup areas based on chemical exceedances.

- Areas with little-to-no wood debris were defined as those areas with wood debris covering less than 25 percent of the sediment surface and with a total TVS content of 20 percent or less. A TVS of 20 percent, in the HWDS, corresponds to approximately 25 percent wood debris by volume, or 10 percent by weight. These areas were identified as "no further action areas", based on wood debris.
- Low-to-moderate wood debris accumulation areas were defined as those areas with intermediate values, or with one, but not both, parameters (TVS or coverage) elevated. These areas went through further evaluation in Tier 2.

In Tier 2, the following additional information was evaluated:

- Porewater ammonia and sulfide concentrations
- Bottom water column dissolved oxygen concentrations and drawdown rates
- Carbon-enrichment of the < 0.25-inch fraction of the sediment
- Bioassay testing

In the HWDS no correlation was identified between these parameters and wood debris content in the low-to-moderate wood debris accumulation areas.

The Tier 1 criteria were effective in designating high wood accumulation areas and areas of no further action. The Tier 2 results were useful in eliminating potential cleanup areas, but were not useful in identifying cleanup areas based on the presence of wood. Therefore, the Tier 2 evaluation eliminated stations with low-to-moderate wood as cleanup areas when both bioassays and other parameters indicated no apparent effects. Areas with bioassay failures, but no other indicators of potential stressors, were further evaluated, as discussed below.

4.1.6 SPECIAL CONSIDERATIONS FOR SQS-LEVEL BIOASSAY FAILURES

Special consideration was given to stations with SQS-level bioassay failures that did not have known chemical SQO exceedances or high wood debris accumulations. Six stations met these conditions: HOW-B01, HOW-B02, HOW-B03, , HOW-B08, HOW-B11, and HY-26.

Special Consideration 1: Where an SQS failure occurred in an area of low-to-moderate wood debris accumulation and where future wood debris accumulation may occur as a result of normal operations, the area was designated a cleanup area. This criterion captures the bioassay failure at HOW-B11, which is located near Weyerhaeuser's dock. This failure does not appear to be related to the accumulation of wood debris; however, dredging in this area meets long-term operational and maintenance goals and satisfies the State's preference to address areas with SQS failures.

Special Consideration 2: HY-26, is located in an area off Manke's dock, where there is a thin coating (less than 1 foot) of soft sediment and wood debris on top of a layer of native sediment.

The native sediment consists of less than a foot of clayey silt, underlain by silty sand. Removal of the wood debris and disturbed (soft) native sediment in this area is consistent with the need to maintain the navigational channel depth in front of Manke's dock and satisfies the State's preference to address areas with SQS failures.

Special Consideration 3: Stations HOW-B01, HOW-B02, and HOW-B03 are part of an isolated area near the mouth of the Hylebos Creek. There were SQS larval failures at these stations. This area is being evaluated using a net environmental benefit analysis (NEBA) that considers:

- The material to be removed
- The type of sediment that would exist in the area after dredging
- Continued sedimentation of the creek-side part of the area by Hylebos Creek combined with ship scour of the basin-side part of the area

The outcome is that this area is unlikely to benefit from wood debris removal. However, additional monitoring will be performed to confirm that no net environmental benefit will be realized by future wood debris and sediment removal in this area.

Special Consideration 4: Station HOW-B08 is located in an area of sporadic deposition on the boundary between an area of low-to-moderate wood debris accumulation and an area of little-to-no wood debris. HOW-B08 is also located on the edge of a scour zone created by tugboat propeller wash during ship turning activities. There was an SQS larval failure at this station. Since HOW-B08 is located in an area of ship scour and sporadic wood debris deposition, it was eliminated from further consideration for active remediation. HOW-B08 will be monitored as part of the net environmental benefit monitoring program.

Summary: Six stations had SQS bioassay failures without corresponding chemical SQO or wood debris criteria exceedances. Two of the stations have been incorporated into areas designated for cleanup. The other four stations are in areas where cleanup may or may not produce a net environmental benefit; therefore, these stations were not designated for active remediation. Additional investigation and/or monitoring will be used to evaluate whether future remediation will provide a net environmental benefit for the four remaining stations.

4.2 IDENTIFICATION OF CLEANUP AREAS

Cleanup areas were developed using the sequential approach identified in Section 4.1 above. Selected areas were subjected to special consideration as described in Section 4.1.6. Table 4.1 identifies cleanup areas within the HWDS and summarizes screening results and the rationale for each designation. The areas, including their numeric designation are shown in Figure 4.1.

The WDG also identified areas with SQO chemical exceedances within the Neck and the UTB. Consistent with the WDG AO and CD, the WDG is not responsible for sediment and wood debris contaminated by non-wood related chemicals with concentrations greater than the PSDDA ML or by PCBs greater than 300 µg/kg. This exclusion has resulted in a return of the Neck area to the Agencies, with the exception of a small intertidal area near Weyerhaeuser that

also contains clean wood debris, as shown in Figure 4.1. The Neck area cleanup extends into the UTB as far as necessary to remove chemically contaminated sediment that does not contain wood debris that requires cleanup. Cleanup Areas 142, 123, and 103 are being remediated by other parties under the CERCLA process, and are not part of the WDG cleanup.

5.0 Summary of Cleanup Alternatives Considered

Three remedial approaches were evaluated for removal of wood debris and cleanup of chemically contaminated sediment within the HWDS: natural recovery/enhanced natural recovery, removal, and capping. The following sections summarize these remedial approaches and their anticipated effectiveness.

5.1 NATURAL RECOVERY/ENHANCED NATURAL RECOVERY

This remedial approach recognizes the tendency for sediment quality to improve over time as natural sedimentation forms a cap over contaminated sediment and as natural degradation over time reduces the amount of wood present in the sediment. Enhanced natural recovery speeds natural recovery without removal of material by placing a thin layer of clean material to augment natural sedimentation.

Natural recovery of wood debris in the HWDS will take place over time from both natural sedimentation and slow degradation of the wood debris; however, for most areas natural recovery will be a slow process. Natural sedimentation rates in the waterway are low and examination of shoaling patterns suggests that the continued movement of ships stirs sediment and moves it toward the banks and under dock areas. Allowing natural recovery to occur within the shipping channel is inconsistent with the Rivers and Harbors Appropriations Act of 1899, Section 10, because it has the potential (in the long term) to negatively impact navigation.

Enhanced natural recovery, which is achieved by applying a thin cap of clean material, is not considered feasible for much of the HWDS. The depths in most of the waterway are already insufficient for navigation and the addition of material will only reduce available depths. However, a thin application may be feasible in some limited areas outside the channel line if chemical contamination is less than the SQOs and navigation will not be impaired.

Natural recovery/enhanced natural recovery is not considered a viable alternative for the Cleanup Areas 1 through 7 in the HWDS.

5.2 REMOVAL

Sediment removal involves dredge excavation of target materials from the waterway. Several dredging alternatives were considered in the context of the conditions in the HWDS with respect to effectiveness, implementability, and probable cost. The project was divided into two phases recognizing the different dredging conditions to be encountered. The first phase is the removal of logs and large wood debris (wood debris with a length greater than two feet). The second phase is the removal of remaining wood debris and impacted sediment.

5.2.1 DREDGING ALTERNATIVES

Mechanical Dredging. Mechanical dredging is the logical method for removal of logs and large wood debris. Log tongs, orange peel buckets or clamshell buckets are designed to grasp submerged underwater debris and facilitate lifting it to the surface. Recovered material is placed on a barge and removed to shore for reprocessing or disposal.

Mechanical dredging is also suitable for the removal of remaining wood debris and sediment. Use of modified conventional or environmental dredging buckets minimizes resuspension during the dredging process. It is anticipated that a second pass would be necessary to dredge areas in exceedance of acceptance criteria.

The advantages of mechanical dredging include the availability of equipment and contractor experience, high solids content of recovered material, good control of the cut in both the vertical and horizontal directions, and ability to deal with remaining metal debris including wires and bands. Disadvantages include possible overdredging to achieve thin cuts, difficulty in accessing areas under docks, and the potential for redistribution of material during the dredging process.

Hydraulic Dredging. This type of dredge uses water as the conveying medium for transporting material to the disposal area. Conventionally, material is loosened by a cutterhead mounted on the front of the dredge which puts material into suspension so it can be drawn into the suction inlet. Variations include use of plain suction without cutterhead. Recent technologies have modified the impellers in conventional dredge pumps which place them closer to the bottom where their suction action loosens material that is then drawn into the pump. Other technologies include use of horizontal augers and other methods aimed at minimizing resuspension and enhancing the flow of solids.

Given the irregular nature of the material to be removed, the clay content of the native materials, and the debris expected to remain after the initial debris sweep, it is anticipated that a cutterhead dredge would be the type of hydraulic dredge best suited to this project. The effectiveness of the plain suction dredge or the open pump systems would be negatively affected by the variability of bottom conditions. A cutterhead dredge would be more effective with the variability of materials but would resuspend material, particularly in the vicinity of the cutter, compared to plain suction inlet.

Several issues arise when considering the use of any type of hydraulic dredge. The maximum dredging depths are expected to be in the range of 50 plus feet (41-foot nominal depth plus 12-foot tides). Conventional pond or auger dredges cannot achieve these depths. Realistically, a conventional pipeline dredge would probably be modified and possibly downsized for the work although there are medium sized dredges capable of dredging at these depths.

Hydraulic dredges draw in water as the conveying medium for moving solids. In continuous dredging projects with a deep bank it would be typical that hydraulic dredging added water at a ratio of 4:1 (water to *in-situ* volume removed). For this project this figure could be in the 10:1 or greater range. Dealing with this "excess" water requires that an upland disposal area be located and designed to assure that return water meets applicable water quality standards. The

dredged material will have "bulked" due to the added porewater which will increase transportation and disposal costs (and possibly add cost associated with mechanical drying of the material) compared to the mechanical dredging alternative.

In summary, the advantages of hydraulic dredging include the availability of equipment and contractor experience, potential for minimizing resuspension in the water column, reasonable control of the cut in both the vertical and horizontal directions, and the ability to deliver material directly to shoreside disposal areas by pipeline. Disadvantages include the likelihood of significant downtime caused by debris clogging the pump, the need to dewater dredged materials and treat the decant water, the increased cost for processing and disposal of recovered solids, possible overdredging to achieve thin cuts, and difficulty in accessing areas under docks.

5.3 CAPPING

Capping places a layer of clean material between the contaminated sediment and the water column to minimize: degradation of water quality, access of the benthic community to the contaminated sediment, and the migration of contaminated sediment to other locations in the waterway.

Cap thickness for environmental projects is typically three feet. Given the restricted navigational depths in the Hylebos Waterway and the present and future navigation needs, capping of existing materials is not considered practical for areas within the navigation channel.

6.0 Selected Cleanup Action

The selected cleanup alternative consists of the following components:

1. Mechanical dredging to remove logs and large wood debris.
2. Mechanical dredging to remove smaller debris, woody sediment, and chemically contaminated sediment.
3. Reuse and recycling of wood debris and sediment to the extent possible.
4. Disposal of material that cannot be reused or recycled.
5. Compliance and performance monitoring to assess the effectiveness of the remedy.

In addition to the selected action, the remedial program includes an OMMP to guide future in-water activities at the facilities. The OMMP includes facility modifications to protect and enhance habitat areas at the facilities. These facility modifications, in addition to others needed to support the selected action, are described in the Cleanup Action Design Report (CADR) (FSI, 2000c).

The following sections summarize these components of the selected cleanup action.

6.1 DREDGING

Mechanical dredging will be used to remove wood debris and chemically contaminated sediment from designated cleanup areas within the UTB (Figure 4.1). The estimated cleanup volumes for the UTB are based on removing wood debris and sediment down to the deepest historical dredge level. Table 6.1 presents the estimated dredge volumes for cleanup areas within the UTB. These volumes include a one-foot overcut allowance. Performance monitoring will confirm that Ecology cleanup criteria and requirements have been met for wood debris and contaminated sediment removal.

The type of mechanical dredging equipment used will depend on the type and depth of material present within a given cleanup area. The dredging techniques that may be used for the various types of material found in the UTB are discussed below.

6.1.1 REMOVAL OF LOGS AND LARGE DEBRIS

Removal of logs and large wood debris will be accomplished by means of conventional mechanical dredging equipment outfitted with log tongs, orange peel buckets, clamshell buckets, or other attachments. Debris will be placed on a deck barge and moved to a suitable dock for transfer upland. It is anticipated that all medium and high log density areas of the UTB, with the exception of the delta at the mouth of Hylebos Creek, will be swept to remove approximately 90 percent of the logs and large debris.

The techniques, process, and equipment for removal of this material are well understood and there are several contractors with the experience and equipment to assure competitive contracting conditions.

6.1.2 REMOVAL OF SMALL WOOD DEBRIS AND CONTAMINATED SEDIMENT

Removal of small wood debris and contaminated sediment will be accomplished by mechanical clamshell dredge. A contingent final pass, using a Cable Arm (environmental) bucket or similar equipment, will be undertaken, if needed, to meet cleanup standards. The dredged material will be placed on a barge for PSDDA disposal or for upland transfer.

The techniques, process, and equipment for removal of this material are well understood and there are several contractors with the experience and equipment to assure competitive contracting conditions.

6.1.3 REMOVAL OF ARSENIC-CONTAMINATED SEDIMENT FROM BENEATH MANKE DOCK

A portion of the sediment beneath the Manke dock contains arsenic at concentrations greater than the SQO criteria. Removal of these sediment will be accomplished using two distinct methods. A small percentage of the impacted sediment are accessible from the bank and will be removed using small track-mounted earthwork equipment. The remainder of the target sediment will be removed using custom fabricated equipment operated from a barge located adjacent to the face of the dock. The custom bucket will operate beneath the dock to pull the impacted sediment to the toe of the slope. A conventional clamshell bucket will then be used to recover impacted sediment.

6.2 REUSE, RECYCLING, AND DISPOSAL OPTIONS FOR DREDGED MATERIALS

Much of the material removed from the HWDS by the WDG is wood debris that does not contain chemical contamination. This may provide an opportunity to reuse or recycle some of the recovered materials. Reuse or recycling is Ecology's preferred option for MTCA actions.

Much of the recovered material may not be appropriate for reuse or recycling, either because of the amount of entrained sediment or because of chemical contamination. Additional assessment is ongoing to refine viable reuse, recycling, and disposal options. Section 6.2.1 summarizes the reuse, recycling, and disposal options that will be assessed and assessment methods for the materials removed.

6.2.1 REUSE, RECYCLING, AND DISPOSAL OPTIONS

Potential reuse and recycling options for recovered wood debris include:

Finished Lumber. Recovered logs may be suitable for milling and conversion into finished lumber. Logs of this quality were not recovered during the Pilot Study. However, if logs of sufficient quality are identified during actual dredging operations, they will be taken to Manke Lumber for reuse.

Chips. Recovered logs may be suitable for production of wood chips. Wood chips are used as a raw material for the manufacture of pulp and other products. Logs chipped during the Pilot

Study produced chips that were appropriate for use for Kraft paper, and have since been made into paper. This is currently the most likely use of recycled logs from the WDG cleanup.

Hog Fuel. Recovered logs and other coarse wood debris may be suitable for conversion into hog fuel. Hog fuel is a wood-based fuel used to fire industrial boilers. The presence of sediment in the wood is the major limitation on the production of hog fuel; this will likely limit the recycling opportunity to logs and large wood debris only.

Beauty Bark, Compost Feedstock, and Soil or Sediment Amendment Materials. Grinding of wood debris may allow for production of suitable landscape products and/or soil or sediment amendment material. Because of the availability of sufficient uplands woody debris that has not been soaked in salt water, there does not appear to be a market for dredged wood debris at this time.

Unregulated Fill. Reuse of dredged materials as controlled fill at an appropriate site is a potential remedial option for all sediment with concentrations less than or equal to the appropriate soil criteria under MTCA, provided that placement of the dredged material at the potential site complies with all applicable state and local requirements."

Potential disposal options for recovered wood debris and sediment include:

Open-water Disposal. Materials recovered/removed/dredged from the UTB are being evaluated for disposal at a Puget Sound open-water disposal site. Core samples will be collected from planned cleanup areas and will be analyzed in accordance with PSDDA protocols to determine the suitability of this disposal option. The disposal of suitable dredged materials is appropriate because the material is being removed from navigational channels, berthing areas, and active navigation areas in order to return the UTB to its original configuration.

Upland Landfill. Recovered wood debris and sediment that is not suitable for PSDDA disposal may be disposed of at an upland solid waste landfill provided that it meets landfill acceptance criteria. It is anticipated that Weyerhaeuser's landfill located in Cowlitz County, Washington will be utilized if upland landfill disposal is undertaken. Other regulated solid waste landfills may also be appropriate.

The planned cleanup activities are not expected to generate hazardous or dangerous wastes. However, if this type of regulated waste is generated, disposal would take place at an appropriate permitted Subtitle C Landfill facility.

Nearshore Landfill. To date, a specific nearshore site has not been identified for disposal of recovered wood debris. The WDG does not plan to construct such a site because the volume of material destined for disposal rather than reuse, is not expected to justify the cost of construction. However, several multi-user nearshore landfills have been proposed for other Commencement Bay remediation projects. These projects typically must dispose of significant volumes of material, which justifies construction of specific disposal facilities. The volume of material the WDG project may generate for disposal is likely less than 10 percent of the volume of contaminated sediment currently projected for cleanup over the next few years in

Commencement Bay. Therefore, proposed sites will be considered as generic sites, and use will be evaluated on a tipping fee basis.

Confined Aquatic Disposal. A project-specific confined aquatic disposal (CAD) cell located inside the UTB appears to be technically feasible given the quantity and type of materials to be generated during the WDG removal action. The technical feasibility assumes that the majority of logs are recycled, and that the CAD needs to contain 100,000 cubic yards, or less, of wood debris and sediment. The feasibility of this alternative in terms of continued navigational use during construction, community acceptance, landowner acceptance (the Port of Tacoma owns the area where it would be situated), and bay-wide resource planning has not been evaluated at this time, and is further complicated by the HCC's consideration of the UTB as a CAD site for chemically-contaminated sediment from the CERCLA action.

Construction of a WDG CAD site is currently ranked lower than alternatives that involve a combination of recycling, open-water disposal, and upland landfill disposal. However, should the wood debris in the UTB be found to contain higher levels of chemical contamination than expected, or be found unsuitable for either PSDDA disposal and/or reuse due to material properties, the WDG retains the right to investigate further a project-specific CAD alternative.

As with nearshore landfill disposal, the WDG will consider proposed multi-user CAD sites as generic sites, and the potential use of these sites will be evaluated on a tipping fee basis.

6.2.2 CONTINUED ASSESSMENT OF REUSE, RECYCLING, AND DISPOSAL OPTIONS

Additional assessment is on-going to assist in defining viable reuse, recycling, and disposal options. Results of the assessments will be summarized in technical memoranda that will become part of remedial design reports. Assessment studies will include a PSDDA suitability evaluation.

PSDDA Suitability Evaluation. A PSDDA suitability evaluation is being performed to identify the volume of the material removed from the UTB that meets disposal criteria at designated Puget Sound open-water disposal sites. Chemical results from the PSDDA investigation are summarized in Section 4, above. The full PSDDA Report and suitability determination are expected later this year, with the suitability determination expected in spring of 2000.

6.3 MONITORING OF CLEANUP ACTIONS

Monitoring of cleanup actions will consist of the following tasks:

- Water quality compliance monitoring during dredging and materials handling to confirm that water quality standards, as defined during the USACE permitting process, are met during the dredging. Four continuous reading, *in-situ* monitoring stations, equipped with DO and turbidity monitors, will be established to encompass both cleanup and return-water areas. Dredging activities will be suspended temporarily if permit conditions are exceeded, even if the exceedances are due to natural conditions.

- Performance monitoring to confirm that the cleanup levels and requirements have been met for sediment and wood debris removal. Surface sediment grab samples will be analyzed for chemistry and/or wood content, as appropriate, in order to identify which areas or sub-areas, if any, require re-dredging to meet cleanup requirements. The final performance monitoring will be used as confirmation monitoring and will form the baseline for the source control monitoring program discussed in the OMMP.

A Compliance Monitoring Plan (CMP) (FSI, 2000c) has been prepared as part of the Cleanup Action Design process and as part of the USACE permitting process for the action.

For cleanup of wood debris under this action, the following compliance values will be used: TVS less than or equal to 15 percent and wood coverage less than or equal to 50 percent. Cleanup of chemically contaminated sediment will be to SQOs discussed in Section 4 of this document. The CMP specifies the measurement protocols for these parameters.

6.4 CONTINGENCIES

6.4.1 COMPLIANCE WITH CLEANUP STANDARDS

Field screening will be conducted during construction to document dredging progress in relation to the design depths and removal of wood debris. Dredging will continue at each site until the design depth is attained (as documented by hydrographic surveys), or when significant quantities of wood debris are no longer visible in recovered sediment. The cleanup area will then be surveyed along transects using underwater video equipment to estimate the amount of remaining wood debris coverage. The results from this analysis will be used to determine the need for any additional dredging prior to conducting performance monitoring.

Performance monitoring will commence when field screening indicates that dredging is complete. Surface sediment grab samples will be collected from sub-cells within each cleanup area and compared to the applicable cleanup criteria for the specific area. Should performance monitoring indicate that additional dredging is warranted, an environmental bucket will be used to redredge the area using careful and well-documented best management practices (BMPs).

6.4.2 NET ENVIRONMENTAL BENEFIT ANALYSIS

A net environmental benefit analysis (NEBA) will be conducted to assess whether areas that contained SQS bioassay failures that were not dredged as part of this action, warrant any further action. The main area containing these SQS failures has been referred to in previous documents as the "East Central Upper Turning Basin (ECUTB)." The NEBA will compare the benthic communities in the NEBA areas, including the ECUTB, to other communities in areas in the UTB that were dredged. If the community in the NEBA areas differs significantly from those found in locations in the UTB where wood debris was dredged as part of the HWDS program, Ecology may require further actions to address the ECUTB.

In order for the benthic community to establish itself in the dredged areas, the analysis will not occur for a minimum of 3 years after the dredging. Details on the approach and the timing of the activity, especially as it relates to other activities occurring in the waterway, are contained in the CMP, an attachment to the CADR.

6.5 OPERATIONS, MAINTENANCE, AND MONITORING

The WDG members will implement an Operation, Maintenance, and Monitoring Plan (OMMP) to ensure the long-term effectiveness of the remedy. The OMMP includes BMPs to minimize the amount of wood debris generated during future log handling and storage activities. These BMPs include:

- Use of easy lift and letdown devices or hard-surfaced ramps to transfer logs into and out of the waterway from upland sites.
- All logs will be bundled before they are placed into the water and will remain bundled while in the water.
- No settling (grounding) of logs or boom sticks (used to contain bundles of logs in a raft or pen) will occur except in an area immediately waterward of log transfer devices. Log raft containment structures at WDG facilities (consisting of new pilings and boom sticks, as discussed in Section 6.6) may be constructed to satisfy this requirement.
- Stray logs and boom sticks that accidentally ground will be retrieved within specified time periods.
- Log storage will occur in designated areas.
- A fish passage corridor will be preserved at the mouth of Hylebos Creek.
- In-water log storage will be governed by a hierarchy of storage preferences with the upland storage of logs as the most favored activity and the transfer of logs into the waterway for subsequent rafting to other destinations as the least favored option.

Source control monitoring will be conducted to verify that the OMMP is effective and that wood debris does not re-accumulate in significant amounts. All locations where logs are transferred to or from the water, loaded on ships directly from the water, or stored in rafts or pens, will be monitored for wood debris accumulation. Wood accumulations greater than set screening levels may require a response from the WDG companies to conduct additional maintenance dredging. Use of BMPs is expected to minimize this need.

To facilitate maintenance dredging in log handling and storage areas, long-term (10-year) maintenance dredging permits that are specific to each of the WDG facilities will be requested from the USACE.

6.6 HABITAT PRESERVATION AND PROTECTION AND FACILITY MODIFICATIONS

This section summarizes modifications to individual WDG facilities that will be required as a result of cleanup actions or to meet future OMMP requirements.

6.6.1 DOCKS AND ANCILLARY STRUCTURES

Removal of accumulated wood debris and chemically contaminated sediment from the UTB may require the repair or replacement of portions or components of dock and ancillary structures that currently occupy these areas. Repair and replacement work will be conducted during or immediately following cleanup dredging activities. Cleanup design and construction documents will define and describe related repair and/or replacement work. To date, the breasting dolphins at the Weyerhaeuser dock (Figure 6.1) have been identified as likely to require emergency repair or replacement.

6.6.2 LOG-RAFT CONTAINMENT STRUCTURES

To facilitate compliance with the requirement to minimize log and boom stick grounding in the intertidal and shallow subtidal areas, new wood pilings with boom sticks will be constructed. The pilings and boom sticks will be installed in a line parallel with the shoreline, at a location waterward from the shoreline corresponding to the approximate -12 feet MLLW line (Figure 6.1). Additionally, the Weyerhaeuser float, which is also used to contain log rafts, will be relocated, and/or reconstructed to minimize log grounding.

6.6.3 BERTH DEEPENING AT MANKE

The berthing area adjacent to the Manke Lumber Company dock will be deepened to minimize ship grounding and prop scour disturbance of sediment within the berthing area at low tide. Current plans anticipate that the deepening effort will be accomplished concurrently with cleanup dredging, using the same equipment. Wood debris and contaminated sediment removal will expose native sediment in front of the Manke dock at an average depth of -32 feet MLLW. Native material will then be dredged to -40 feet MLLW to deepen the berthing area within an approximate 80 feet by 600 feet footprint. Excavation slopes will be 4H:1V on all faces except for the shoreward (or near-dock) face, which will be sloped at 2H:1V. Approximately 22,100 cubic yards of native sediment will be removed to deepen the berthing area. It is anticipated that this material will be suitable for PSDDA disposal.

7.0 Justifications and Determinations for the Selected Alternative

Based on the results of the cleanup study investigation and the cleanup alternatives evaluation, the following justifications and determinations have been made with respect to the selected cleanup alternative:

Compliance with Threshold Requirements Under MTCA and SMS. The selected cleanup alternative will achieve the cleanup objectives and responsibilities outlined in Section 4.1 by removing target wood debris and chemically contaminated sediment, and by ensuring that dredged material is either reused, recycled or disposed of appropriately and pursuant to operable laws and regulations. These actions will be protective of human health and the environment, as they will result in a cleanup that achieves the cleanup standards established in Section 4.1.4 (using both chemical SQS and wood performance criteria). The cleanup will comply with applicable state and federal laws (Table 7.1), and it will provide for compliance monitoring as described in Sections 6.3 and 6.4. The selected alternative therefore meets the MTCA threshold requirements set forth in WAC 173-340-360(2), and SMS requirements set forth in WAC 173-204-580(2)(b),(c),(d) and (g), for the selection of a cleanup action.

Use of Permanent Solution to the Maximum Extent Practicable. The selected cleanup alternative employs, to the maximum extent practicable, a "permanent solution" pursuant to WAC 173-340-360(5)(b), in that it will achieve cleanup standards in the UTB without any further action being required at the site (other than operations, maintenance, and monitoring activities) or at any other site involved with the cleanup action. Reuse and recycling of wood debris removed from the UTB will occur where appropriate, technically feasible, and cost effective. The selected alternative thus meets the requirements set forth in WAC 173-340-360(3)(a) and (b).

Consideration of Factors Regarding Permanence. A solution that is "permanent to the maximum extent practicable," is based upon specific criteria regarding protectiveness, effectiveness, reduction, implementation, costs and community concerns. (WAC 173-340-360(5)(d)) The selected cleanup alternative can be considered with respect to these criteria as follows:

- **Overall Protectiveness.** The selected alternative provides overall protectiveness of human health and the environment by removing targeted wood debris and chemically contaminated sediment. This removal will be accomplished, and cleanup standards attained, within a relatively short time. On-site and off-site risks of implementing the alternative are low. Since the selected alternative principally involves removal of a "deleterious" substance (wood debris) which does not constitute a hazardous substance under SMS, the cleanup action may be seen to perform at a higher level than specific standards in WAC 173-340-700 through 760. The selected alternative will result in an improvement of overall environmental quality in the UTB.
- **Long-term effectiveness.** The technologies involved in the selected alternative (primarily mechanical dredging) are common and well understood, so there is a high degree of certainty that the alternative will be successful. Source-control (operations

and maintenance) and monitoring measures will ensure the long-term reliability of the alternative, and the magnitude of any residual risk will be negligible.

- **Short-term Effectiveness.** The technologies involved in the selected alternative (primarily mechanical dredging) are common and well understood, so it is anticipated that the alternative will be protective of human health and the environment both during implementation and prior to attainment of cleanup standards (i.e., the completion of the removal action).
- **Reduction of Toxicity, Mobility and Volume of Hazardous Substance.** The majority of material to be removed as part of the selected cleanup action—wood debris—does not constitute a hazardous substance or material. In areas where chemically contaminated sediment are removed and disposed of the cleanup action reduces the mobility of the chemicals by placing them in a disposal environment that is approved for their disposal, and designed to be protective of the environment.
- **Implementability.** Mechanical dredging is a proven technology, and is thus considered technically feasible. The availability of off-site facilities necessary to the selected alternative (for the reuse, recycling, or disposal options) will be evaluated as discussed in Section 6.2.1. Administrative and regulatory requirements will be considered at each stage of implementation, and it is anticipated that the cleanup action will comply with all applicable permit and regulatory requirements. Scheduling, size, complexity, monitoring requirements, access for construction, operations and monitoring, and integration with existing operation (principally commercial towing and shipping) and other remedial actions (for example, in the “Neck” of the waterway) all will be considered prior to, and during, implementation of the selected remedy.
- **Cost.** The “concept level” estimate for the removal and final disposal of wood debris and chemically contaminated sediment, including design and construction management services, is approximately \$9.5M. This cost estimate is not considered to be disproportionate to the incremental degree of protection the selected alternative will achieve over a lower-preference cleanup action.
- **Community Concerns.** It is intended that community concerns regarding the selected alternative will be addressed (refer to “Consideration of Public Concerns,” below).

Cleanup/Restoration Time Frame. Since the selected cleanup alternative is essentially a removal action (with off-site disposal and monitoring), the time frame for restoration is effectively the time frame for completion of the project schedule. Completion of cleanup activities is currently anticipated by the end of 2002, depending on the timely receipt of permits. This is considered a reasonable time frame, considering potential risks, practicability of achieving site cleanup standards, current use of the site and surrounding areas, impacts on associated resources and potential future site uses. The selected alternative thus meets the requirements set forth in WAC 173-340-360(3)(b) and WAC 173-204-580(3)(a)(i) through (iv). Considerations regarding institutional controls, migration of contamination from the site and natural recovery processes (WAC 173-204-580(3)(a)(v) through (vii)) are not relevant to the selected alternative.

Consideration of Public Concerns. A Public Participation Plan has been prepared by Ecology that identifies periods for public review and comment on project documents, including the draft final CAP. Ecology will consider all public comments (including those of affected landowners) received during review and comment periods. The selected alternative thus meets the requirements set forth in WAC 173-340-360(3)(c), WAC 173-204-580(2)(f) and WAC 173-204-580(5).

Departmental Review and Approval – As a cleanup action being undertaken in compliance with SMS (WAC 173-204-580), the selected alternative must receive Ecology review and written approval prior to implementation. Such review and approval will occur as pursuant to the CD.

Compliance with Sediment Source Control Requirements – Compliance with the standards set forth in WAC 173-204-400 through 173-204-420, regarding the process for managing sources of sediment contamination, is not necessary for the selected alternative.

8.0 References

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- _____. 2000d. *Hylebos Waterway Wood Debris Program Compliance Monitoring Plan*. Prepared for Wood Debris Group. Seattle, Washington.
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- Tetra Tech. 1985. *Final Report Commencement Bay Nearshore/Tideflats Remedial Investigation*. Volume I. Prepared for Washington State Department of Ecology and U.S. Environmental Protection Agency. Bellevue, Washington.
- United States Environmental Protection Agency (USEPA). 1989. Commencement Bay Nearshore/Tideflats Record of Decision. Region 10, Seattle, Washington.
- _____. 1993. Administrative Order on Consent for Pre-remedial Design Study. Region 10, Seattle, Washington.
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**Hylebos Waterway Wood Debris Program
Cleanup Action Plan**

Tables

FINAL

Table 2.1
Owners (Bolded) and Occupants of Properties Bordering the HWDS

Address, Property #	Owner/Occupant	Type of Operation	Years
3009 Taylor Way	Elf Atochem North America, Inc./Pennwalt Corp	Owner	1957 – Present
	Echo Lumber	Log sorting, debarking, and chipping yard	1984 – 1986
	Dunlap Towing Co.	Log sort yard, sublease from Portac	1979 – 1983
	Portac, Inc. (formerly West Coast Orient Lumber Mill, a subsidiary of Mitsui USA, Inc.)	Log sort yard	1977 – 1983
	Johnson-Byers, Inc. (aka Goodwin-Johnson)	Log sort yard	1967 – 1977
	Balfour Guthrie	Log sort yard	1964 – 1966
	Milwaukee Boom Co.	No activity during ownership	UK – 1957
3401 Taylor Way	Weyerhaeuser Co.	Log sort and export yard	1970 – Present
	Kaiser Aluminum & Chemical Corporation	Owner	1947 – 1970
	DuPont Chemical	Explosives plant	1944 – 1946
3601 Taylor Way	Lone Star Northwest, Inc. / Lone Star Industries, Inc.	Concrete batching	1987 – Present
	Tucci and Sons	Asphalt batching	1993 – Present
	Reidel International, Inc. (aka Pioneer Construction Materials Co.)	Concrete batching	1985 – 1987
	Glacier Sand and Gravel	Former name of Lone Star Northwest	1970 – 1985
	Kaiser Aluminum & Chemical Corporation	UK	1947 – 1970
3701-3825 Taylor Way	Louisiana Pacific Corp.	Sawmill and log yard	1973 – Present
	Cheney Lumber	Sawmill	1967 – 1974
	Port of Tacoma	Owner	1959 – 1967 (varies)
1600-1602 Marine View Dr.	Port of Tacoma	Owner	UK – Present
	Louisiana Pacific Corp.	Log sort yards	1986
	Wasser & Winters Co., Inc.	Log sort yard and storage area	1972 – 1984
	Gitt Brothers	UK	1970 – 1980
	Mitsubishi International Corp.	UK	1968 – 1972

Table 2.1
Owners (Bolded) and Occupants of Properties Bordering the HWDS

Address, Property #	Owner/Occupant	Type of Operation	Years
1622-1630 Marine View Dr.	Norlund Properties, Inc.	Owner, office	1979 – Present
	Norlund Boat Company	Fiberglass boat building, pressure washing	1988 – Present
	Hart Construction	Marine construction	1967 – 1979
	Port of Tacoma	Owner	1940 – 1967
	Tacoma Marine Electric Co.	UK	UK Present
	APUTCO, Inc.	UK	1983 – Present
	Tim Bailey and Associates	Sporting goods sales	1988 – UK
	Pederson Oil, Inc.	Petroleum product storage	1980 – 1986
	Republic Supply Co.	Sublease	1983 – UK
	Harbor Services, Inc.	Outboard motor service and repair	1980 – 1983
	Harbor Construction	UK	1970 – 1980
1650 Marine View Drive	Streich Brothers	Machine repair and structural steel fabrication	1966 – Present
	Port of Tacoma	Owner	UK – 1966
	APUTCO, Inc.	UK	1983 – Present
	Hart Construction	Marine construction	UK – 1979
1670 Marine View Drive	Puyallup Tribe	Owner	1992 - Present
	Port of Tacoma	Owner	1968 – 1992
	Anchorage, Inc.	UK	UK – Present
	Manke Lumber Co., Inc.	Wood products	1974 – 1976
1690 Marine View Drive	Jones-Goodell Corp.	Shipbuilding and repair of metal, fiberglass, and wooden yachts	1976 – Present
	J & G Investments	Owner	1976 – Present
	Jones-Goodell Shipbuilding Corp.	UK	1968 – 1976
	Port of Tacoma	UK	UK – 1968
1720 – 1750 Marine View Drive	Manke Lumber Co., Inc.	Paved storage area for cut lumber, waterfront log boom float	1976 – Present 1964- 1976 (tenant)
	Port of Tacoma	UK	UK

Table 2.1
Owners (Bolded) and Occupants of Properties Bordering the HWDS

Address, Property #	Owner/Occupant	Type of Operation	Years
1720 – 1750 Marine View Drive (cont.)	Norman and Phyllis Nordlund	UK	UK – Present
	Nordlund Boat Co.	Boat building	1967 – 1976
			1970 – 1980 (tenant)
1840 Marine View Drive	Tacoma Boatbuilding Co.	Boat building and repair (Yard No. 1)	UK – 1998
			1969 – Present (tenant)
	Northern Line Machine & Engineering	UK	1975 – 1980
	Frank Lynott	UK	1974 – UK
1902 Marine View Drive	Arne Storm	UK	1927 - 1974
	General Metals of Tacoma, Inc.	Ferrous scrap metals recycling	1992 – Present
			1966 – 1992
	Leslie Sussman/SRS Properties, Inc.	Real estate management	1966 – 1992
	Universal Metals Products	UK	1970 - 1975

UK = Unknown

Table 3.1
Previous and Concurrent Investigation Activities within the HWDS

Investigation/Study	Date	Media	Number of Samples Collected	Analyses/Study
Commencement Bay Nearshore/Tideflats Remedial Investigation (Tetra-Tech 1985)	1984 to 1985	Subtidal Surface and Subsurface Sediment	49 (12 Hylebos Wood Debris Site [HWDS] Samples)	Total Organic Carbon (TOC) Total Volatile Solids (TVS) Nitrogen Sulfide Grain size Volatile Organic Compounds (Volatiles) Semivolatile Organic Compounds (Semi-volatiles) Total Oil and Grease Metals Bioassays Benthic Testing Fish Histopathology Bioaccumulation
		Water Column Particulates	2 (1 HWDS Sample)	Total Suspended Solids (TSS) TOC Nitrogen Semi-volatiles Metals
Commencement Bay Nearshore/Tideflats Feasibility Study (Tetra-Tech, 1988)	1986	Subtidal Surface and Subsurface Sediment	7 (1 HWDS Station)	TOC Nitrogen Sulfide Total Solids (TS) Volatiles Semi-volatiles Lead ²¹⁰ Metals
Assessment of Log Sort Yards as Sources of Metals to Commencement Bay Waterways (Norton and Johnson, 1985)	1984	Subtidal Surface Sediment	4 (4 HWDS Samples)	Grain Size TOC Metals
Summary of Priority Pollutant Data (Johnson, Yake and Norton, 1984)	1980 & 1981	Intertidal Surface Sediment	13 (2 HWDS Samples)	Metals Volatiles Semi-volatiles Pesticides Polychlorinated Biphenyls (PCBs)

Table 3.1
Previous and Concurrent Investigation Activities within the HWDS

Investigation/Study	Date	Media	Number of Samples Collected	Analyses/Study
Summary of Priority Pollutant Data (Johnson, Yake and Norton, 1984) (continued)	1980 & 1981	Subtidal Surface Sediment	33 (5 HWDS Samples)	Metals Volatiles Semi-volatiles Pesticides PCBs
Results from Phase III Sampling-Elf Atochem (Boateng, 1990)	1990	Subtidal Surface Sediment	24 samples (3 HWDS Samples)	TOC Metals Volatiles Semi-volatiles Pesticides PCBs
		East Ditch	8 samples (0 HWDS Samples)	
Sediment Monitoring Report-General Metals (Sweet-Edwards/EMCON, 1991)	1991	Surface Sediment	17 (1 HWDS Sample)	Ammonia Biological Oxygen Demand (BOD) Chemical Oxygen Demand (COD) pH Sulfide Cyanide Oil and Grease Metals Volatiles Semi-volatiles
Organic Pollutants in Waterways Adjacent to Hylebos Waterway (Riley et al., 1981)	1980	Subtidal Surface and Subsurface Sediment	6 cores (1 HWDS core, collected during Johnson et al. 1984 survey as HS-3)	0 to 5 cm interval (reported in Johnson et al., 1984): Metals Volatiles Semi-volatiles Pesticides PCBs Deeper Intervals (5 cm+): TOC Aromatic hydrocarbons Halogenated compounds
Upper Hylebos Property (Landau, 1991)	1989 to 1990	Intertidal Surface Sediment	4 HWDS Samples	TOC TVS Ammonia Sulfide Grain Size Volatiles
		Intertidal Subsurface Sediment	4 HWDS Samples	Semi-volatiles Pesticides PCBs Metals Tributyltin (TBT)

Table 3.1
Previous and Concurrent Investigation Activities within the HWDS

Investigation/Study	Date	Media	Number of Samples Collected	Analyses/Study	
Upper Hylebos Property (Landau, 1991) (continued)	1989 to 1990	Subtidal Surface Sediment	3 HWDS Samples	TOC TVS Ammonia	Semi-volatiles Pesticides PCBs
		Subtidal Subsurface Sediment	3 HWDS Samples	Sulfide Grain Size Volatiles	Metals Tributyltin (TBT)
Commencement Bay Sediment Trap Monitoring Program (Norton, 1996; includes Norton and Bernard 1992 data)	1991 & 1994	Subtidal Surface Sediment and Sediment Traps	7 (1 HWDS Sample)	Total Solids TOC Grain Size Metals	Volatiles Semi-volatiles PCBs Butylins
Natural Resource Damage Assessment Sediment Survey (NOAA, 1995)	1994	Subtidal Surface Sediment	28 (6 HWDS Samples)	TOC TVS Ammonia Sulfide pH Grain Size Volatiles	Semi-volatiles Pesticides PCBs Metals TBT Bioassays Benthic Testing
Hylebos Waterway Pre-Remedial Design Program Round 1 Events 1A and 1B (Striplin, 1996)	1994	Intertidal Surface sediment	69 (21 HWDS Samples)	TOC TVS Ammonia	Pesticides PCBs Metals
		Subtidal Surface Sediment	58 (14 HWDS Samples)	Sulfide pH Grain Size	TBT Bioassays
		Subtidal Subsurface Sediment	57 (29 HWDS Samples)	Volatiles Semi-volatiles	
Hylebos Waterway Pre-Remedial Design Program, Round 1 Event 1C (Striplin, 1998)	1995 to 1996	Intertidal Surface Sediment	30 (8 HWDS Samples)	TOC TVS Ammonia	Semi-volatiles Pesticides PCBs
		Subtidal Surface Sediment	114 (22 HWDS Samples)	Sulfide PH Grain Size Volatiles	Metals TBT Bioassays Benthic Testing
Hylebos Waterway Pre-Remedial Design Program Round 2 (Striplin, 1998)	1998	Intertidal Surface Sediment	2 (1 HWDS Sample)	TOC TVS Ammonia	Semi-volatiles Pesticides PCBs
		Subtidal Surface Sediment	33 (11 HWDS Samples)	Sulfide Grain Size Volatiles	Metals TBT Bioassays

Table 3.1
Previous and Concurrent Investigation Activities within the HWDS

Investigation/Study	Date	Media	Number of Samples Collected	Analyses/Study	
Hylebos Waterway Pre-Remedial Design Program Round 2 (Striplin, 1998) (continued)	1998	Subtidal and Intertidal Sediment	Approximately 300 (37 HWDS Samples)	Selected Indicator Chemicals (1 to 3 compounds)	
Fish Injury Study (Collier et al., 1997)	1994 & 1995	Chinook and Chum Salmon, Rock and English Sole	3 (1 HWDS Sample)	Histopathology	
Sediment Investigation Adjacent to Kaiser Ditch Outfall (Landau, 1993)	1993	Subtidal Subsurface Sediment	40 HWDS Samples	TOC Polycyclic Aromatic Hydrocarbons (PAHs) PCBs (some stations only) Arsenic (some stations only)	
Supplemental Investigation Arsenic at Manke Lumber	1999	Intertidal Surface Sediment	8 HWDS Samples	Arsenic	
		Subtidal Surface Sediment	22 HWDS Samples		
		Subtidal Subfsurface Sediment	7 HWDS Samples		
Hylebos Waterway Wood Debris Program Pilot Study Technical Memorandum	1999	Subtidal Subsurface Wood Debris/ Sediment	4 HWDS Samples	PAHs PCBs Arsenic	
Hylebos Waterway Wood Debris Program PSDDA Investigation	1999	Subtidal Subsurface Wood Debris/ Sediment	35 HWDS Samples	TOC TVS Ammonia Sulfide Grain Size Volatiles	Semi-volatiles Pesticides PCBs Metals TBT

Table 4.1
Description of WDG Cleanup Areas, Non-WDG Cleanup Areas,
and No Action Areas

Area	Rationale for Cleanup Designation	Area Information
WDG Cleanup Areas		
Area 1	<ul style="list-style-type: none"> Moderate to high levels of wood debris. Exceedances of chemical criteria. Exceedances of bioassay criteria. 	<ul style="list-style-type: none"> Variable (low to high) levels of wood debris accumulations. PAH and PCB SQO exceedances in depositional areas. Metals SQO exceedances (primarily arsenic) adjacent to historical boat repair facilities. SQO and MCUL level bioassay exceedances.
Area 2	<ul style="list-style-type: none"> Exceedances of chemical criteria. 	<ul style="list-style-type: none"> Arsenic SQO exceedances adjacent to historical boat repair facility
Area 3	<ul style="list-style-type: none"> Moderate levels of wood debris in ship berthing area. Exceedances of chemical criteria. Exceedances of bioassay criteria. 	<ul style="list-style-type: none"> Variable (no wood to moderate) wood debris accumulations. PAH SQO exceedances in depositional areas. An SQO level bioassay exceedance.
Area 4	<ul style="list-style-type: none"> Moderate levels of wood debris in ship berthing area. Exceedances of chemical criteria. Exceedances of bioassay criteria. 	<ul style="list-style-type: none"> Low to moderate wood debris accumulations in ship berthing area. PAH, PCB, ethyl benzene, and xylene SQO exceedances (only PAHs exceed SQO in PSDDA cores). An MCUL level bioassay exceedance.
Area 5	<ul style="list-style-type: none"> Moderate levels of wood debris in ship berthing area. Exceedances of chemical criteria. 	<ul style="list-style-type: none"> Low to moderate wood debris accumulations in ship berthing area. PAH and PCB SQO exceedances (concentrations do not exceed SQO in PSDDA cores).
Area 6	<ul style="list-style-type: none"> Moderate to high wood debris 	<ul style="list-style-type: none"> Variable (low to high) wood debris accumulations in intertidal area.
Area 7	<ul style="list-style-type: none"> Moderate wood debris accumulations. 	<ul style="list-style-type: none"> Low to moderate wood debris accumulations.
NEBA Area: East Central UTB ² and HOW-B08 ²	<ul style="list-style-type: none"> Exceedances of bioassay criteria. 	<ul style="list-style-type: none"> Low wood debris accumulations. No chemical SQO exceedance. SQO level bioassay criteria exceedances.

Table 4.1
Description of WDG Cleanup Areas, Non-WDG Cleanup Areas,
and No Action Areas

Area	Rationale for Cleanup Designation	Area Information
Non-WDG Cleanup Areas		
"The Neck" (and extension to HY-25)	<ul style="list-style-type: none"> Exceedances of chemical criteria Exceedances of bioassay criteria Moderate to high wood debris 	<ul style="list-style-type: none"> Low wood accumulations depending on location. SQO and MCUL level bioassay exceedances. PAH, PCB, and metals SQO exceedances.
Area 103 ¹	<ul style="list-style-type: none"> Exceedance of chemical criteria. 	<ul style="list-style-type: none"> 4,4'-DDE SQO exceedance.
Area 123	<ul style="list-style-type: none"> Exceedances of chemical criteria. 	<ul style="list-style-type: none"> Phthalates, PCBs, and metals SQO exceedances.
Area 142	<ul style="list-style-type: none"> Exceedances of chemical criteria. Exceedance of bioassay criteria. 	<ul style="list-style-type: none"> Copper and dimethyl phthalate SQO exceedances. An MCUL level bioassay exceedance.
No Action Areas		
UTB outside of designated cleanup areas	<ul style="list-style-type: none"> No exceedance of wood, chemical, or bioassay criteria. 	<ul style="list-style-type: none"> Low levels of wood debris accumulations. No chemical SQO exceedance. No bioassay criteria exceedance.

Notes

- ¹ Proposed natural recovery area
² A Net Environmental Benefit Analysis will be performed for this area (refer to text Section 6.4.2)
 SQS Washington State Department of Ecology Sediment Quality Standard
 MCUL Washington State Department of Ecology Cleanup Screening Level/Minimum Cleanup Level
 SQO Hylebos Waterway Record of Decision Sediment Quality Objective
 UTB Upper Turning Basin

Table 6.1
Estimated Dredging Volumes

Area Number	Area of Dredge Prism Footprint (acres)	Total Volume (cy)
1	9.23	111,000
2	0.47	4,300
3	2.63	21,000
4	0.45	2,500
5	0.37	5,000
6	0.07	300
7	0.38	4,300
Logs Outside Cleanup Areas 1-7 ¹	10.45	4,000
Manke Berth Deepening	1.37	22,100
Total		174,500

Notes

1. This area represents medium and high density log distribution areas within the Upper Turning Basin, outside of Cleanup Areas 1 through 7, where only logs will be recovered.
2. Volumes determined assuming dredge cuts extend to the deepest historical dredge depth plus a 1-foot allowance to accommodate overdredging.

Table 7.1
Summary of Applicable, Relevant and Appropriate Requirements (ARARs)

ARARs	Citation	Subject/Issue	Applicability, Relevance, and/or Appropriateness
Chemical-Specific			
Sediment Management Standards (SMS)	Chapter 173-204 WAC	Establishes standards for the quality of surface sediments.	Applicable requirement for the cleanup of the HWDS.
Model Toxics Control Act (MTCA) Cleanup Regulation	Chapter 173-340 WAC	Establishes administrative processes and standards to identify, investigate, and clean up contaminated sites.	Applicable requirement for the cleanup of the HWDS.
Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)	42 USC 960	The HWDS is located within the footprint of the Head of the Hylebos Waterway Problem Area of the Commencement Bay Nearshore/Tideflats (CBN/T) Superfund Site.	Appropriate and relevant requirement for the cleanup of the HWDS.
Puget Sound Dredged Disposal Analysis (PSDDA) 1988)	CWA §401 and §404(b)(1)	Establishes chemical and biological criteria for open water disposal of dredged material in Puget Sound.	Applicable requirement for the cleanup of the HWDS.
The Clean Water Act (CWA)	33 USC §1251 et seq.	Provides guidelines and standards to control the direct or indirect discharge of pollutants to waters of the United States.	Relevant and appropriate requirement for project cleanup actions within the HWDS and to potential discharge of dredged material into navigable waters.
Water Quality Standards for Surface Waters of the State of Washington	Chapter 173-201A WAC	Establishes water quality standards for surface waters of the state.	Applicable to cleanup of the HWDS.

Table 7.1
Summary of Applicable, Relevant and Appropriate Requirements (ARARs)

ARARs	Citation	Subject/Issue	Applicability, Relevance, and/or Appropriateness
Action Specific			
State Environmental Policy Act (SEPA)	Chapters 43.21C RCW; 197-11 WAC	Sets forth the state's policy and rules for protection and preservation of the natural environment.	The substantive requirements are relevant and appropriate requirements for cleanup of the HWDS.
Resource Conservation and Recovery Act (RCRA), Subtitles C and D	42 USC 6921-6949a; 40 CFR Part 268	Establishes requirements for the identification, handling and disposal of hazardous and non-hazardous waste.	Washington State has been delegated the authority to implement these regulations, except for land ban restriction provisions (40 CFR Part 268). Therefore, requirements related to land ban restrictions are potentially applicable requirements for disposal.
Dangerous Waste Regulations	Chapter 173-303 WAC	Establishes regulations which are the state equivalent of RCRA requirements for determining whether a solid waste is a dangerous waste and provides requirements for the management of dangerous wastes.	Applicable requirements for upland disposal of material generated by the cleanup of the HWDS.
Washington Hydraulics Code	Chapter 75.20 RCW; Chapter 220-110 WAC	Establishes requirements for actions that use, divert, obstruct, or change the natural flow or bed of any state body of water.	The substantive requirements of these regulations are relevant and appropriate to the cleanup of the HWDS.
Location Specific			
Rivers and Harbors Act	33 USC § 403; 33 CFR Parts 320, 322	This Act and the implementing regulations prohibit unauthorized activities that obstruct or alter a navigable waterway.	Applicable to the cleanup of the HWDS.
Washington Shoreline Management Act; City of Tacoma Shoreline Ordinance	Chapter 90.58 RCW; Chapter 173-14 WAC; Chapter 13.10	Establish requirements for substantial development occurring within the waters of the State or within 200 feet of a shoreline.	Relevant and appropriate requirements for cleanup of the HWDS.

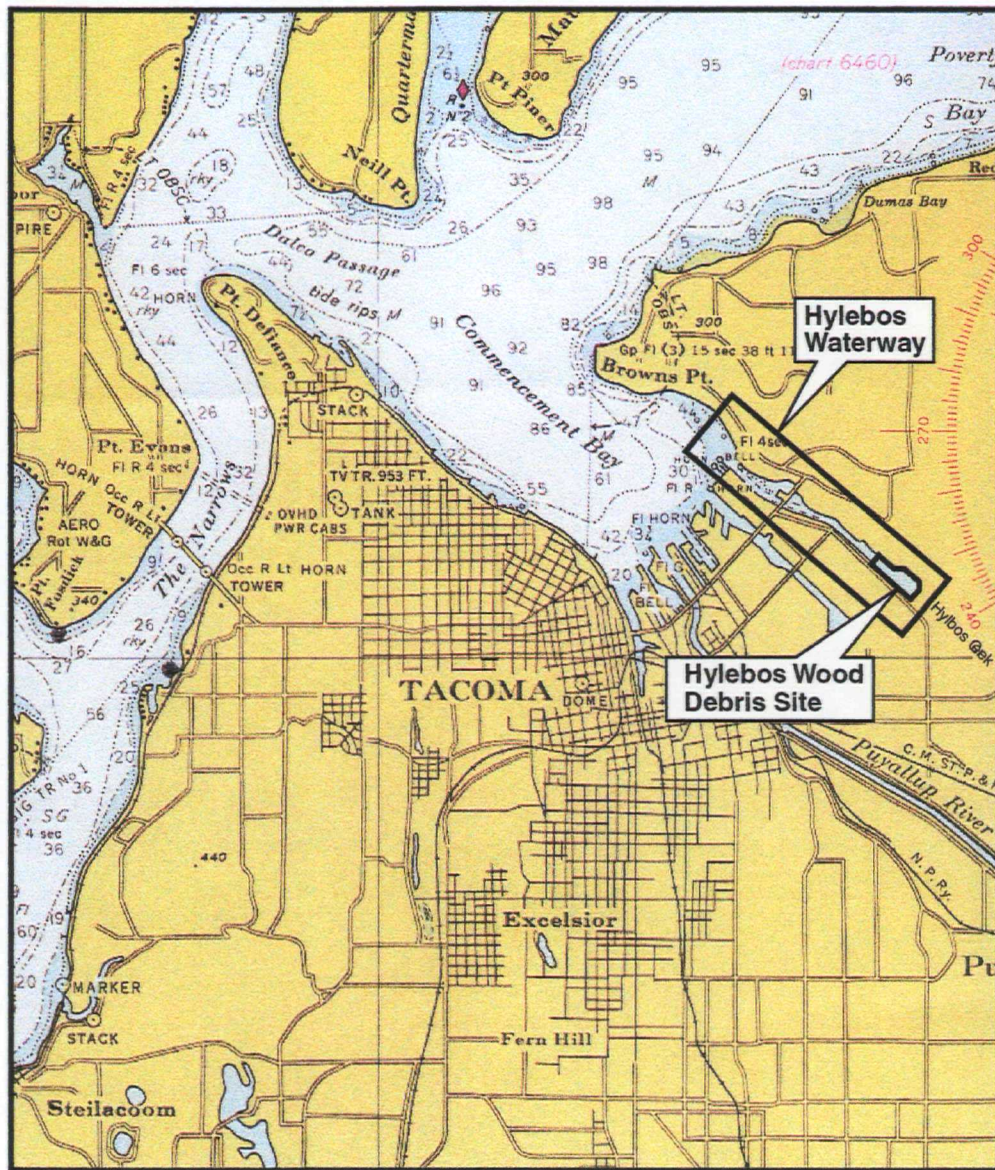
Table 7.1
Summary of Applicable, Relevant and Appropriate Requirements (ARARs)

ARARs	Citation	Subject/Issue	Applicability, Relevance, and/or Appropriateness
Requirements to be Considered			
U.S. Fish and Wildlife Mitigation Policy	46 FR 7644	Establishes guidance for the U.S. Fish and Wildlife Service recommendations to protect and conserve fish and wildlife resources.	To be considered for the cleanup of the HWDS.
Puget Sound Water Quality Act	RCW 90.70.011	The Puget Sound Water Quality Authority has been authorized under this Act to develop a comprehensive plan for water quality protection in Puget sound to be implemented by existing state and local agencies.	To be considered for the cleanup of the HWDS.
Washington Department of Fisheries Habitat Management Policy	POL 410	Calls for no new loss of productive capacity of the habitat of food and shellfish resources, restoration of the productive capacity of habitats that have been damaged or degraded, improvement of the productive capacity of existing habitats, and the creation of new habitats.	To be considered for the cleanup of the HWDS.
Water Resources Act	Chapter 90.54 RCW	Establishes fundamental water resource policies for preservation of Washington State water resources.	To be considered for the cleanup of the HWDS.
Puyallup Tribe of Indians Settlement Act of 1989	Public Law 101-41; 103 Stat. 83	Establishes environmental standards and requirements for fishery enhancement and protection, and provides for cultural and religious preservation for activities affecting tribal interests.	To be considered for the cleanup of the HWDS.

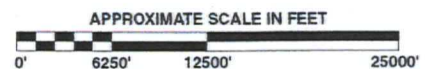
**Hylebos Waterway Wood Debris Program
Cleanup Action Plan**

Figures

FINAL



Map prepared from
U.S. Department of Commerce
1:150,000 Chart
Admiralty Inlet and Puget Sound

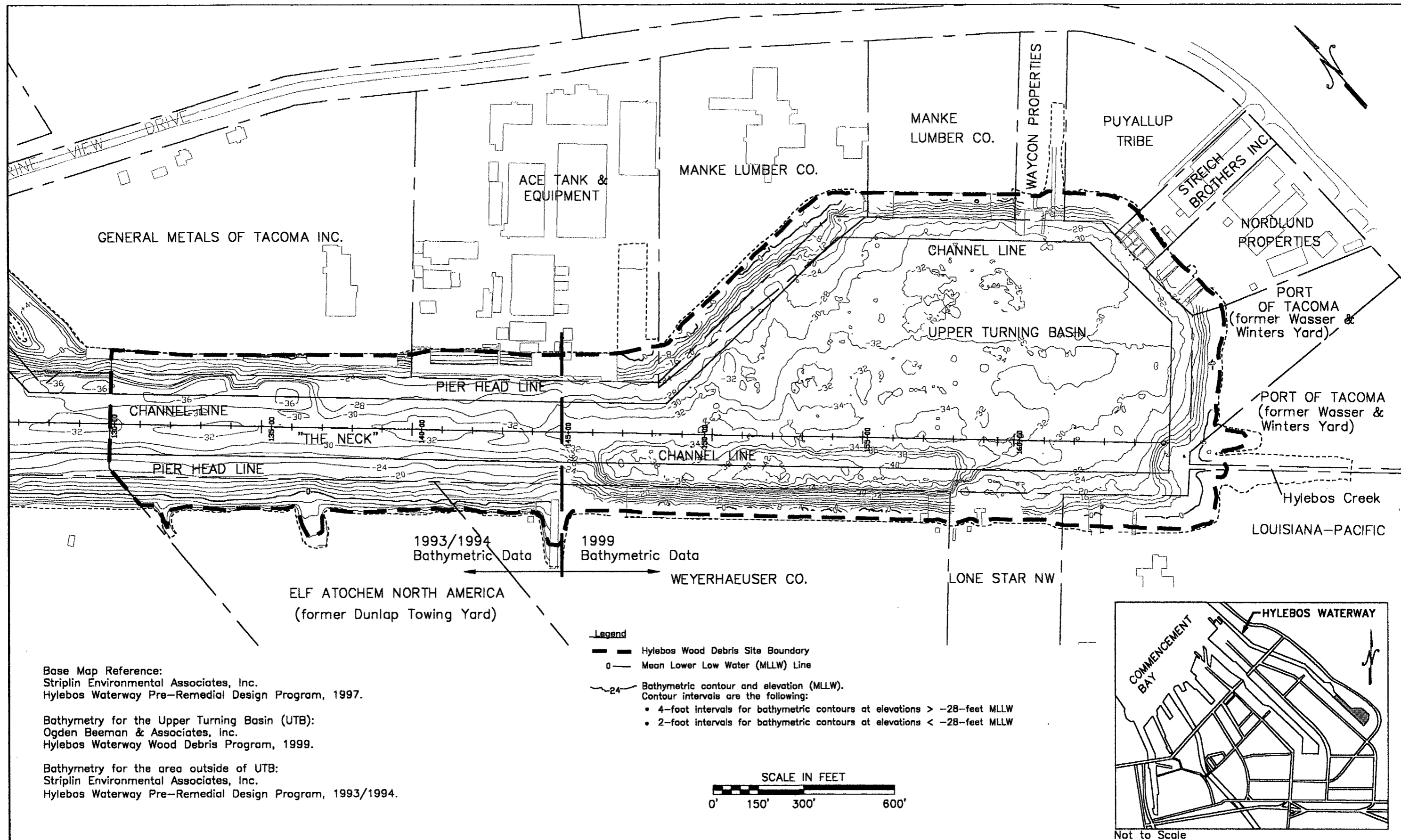


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Hylebos Waterway
Wood Debris Program
Cleanup Action Plan

Figure 1.1
Vicinity Map



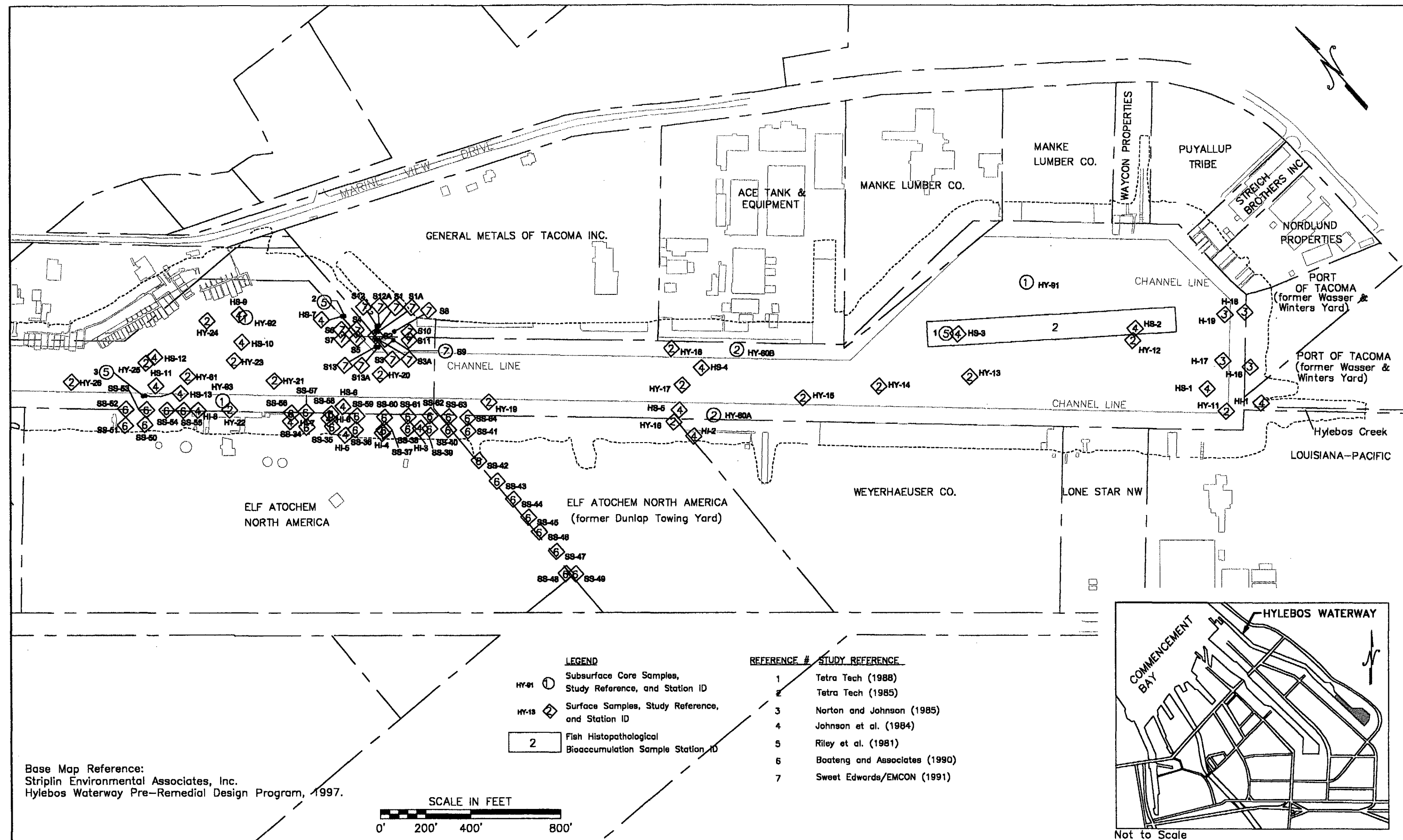
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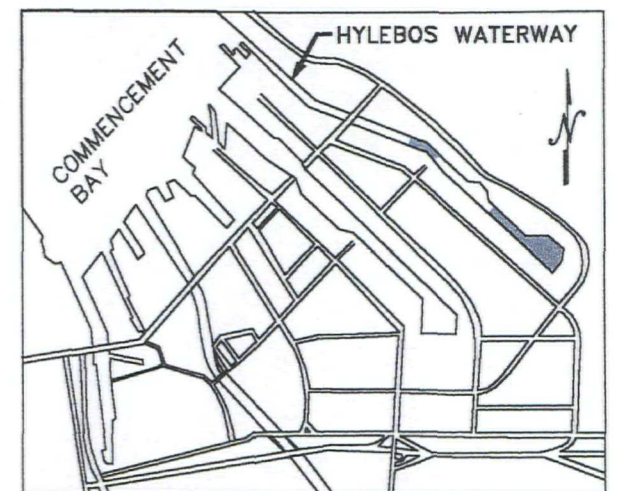
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Hylebos Waterway Wood Debris Program Cleanup Action Plan

Figure 2.1
 Hylebos Wood Debris Site





Not to Scale

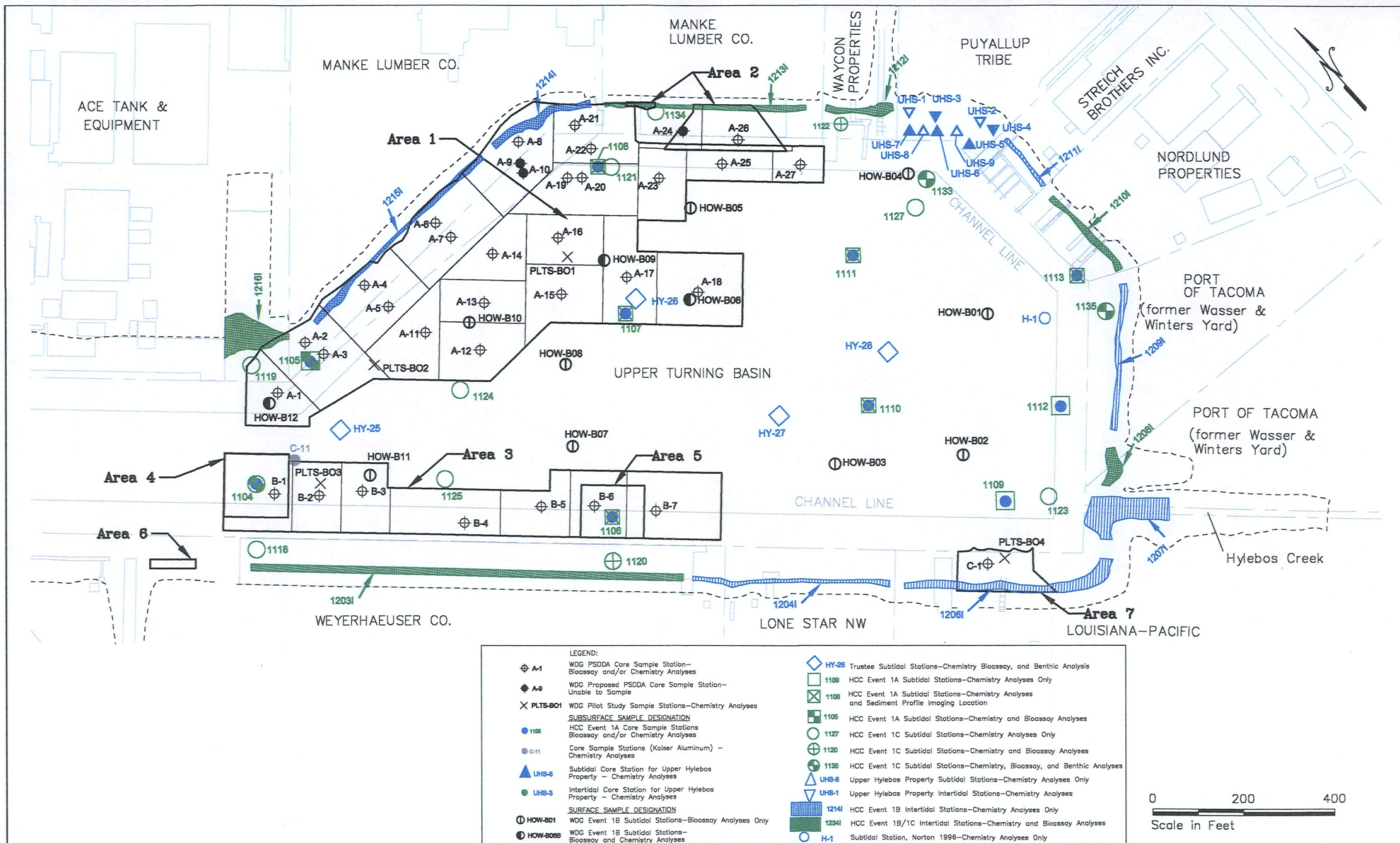
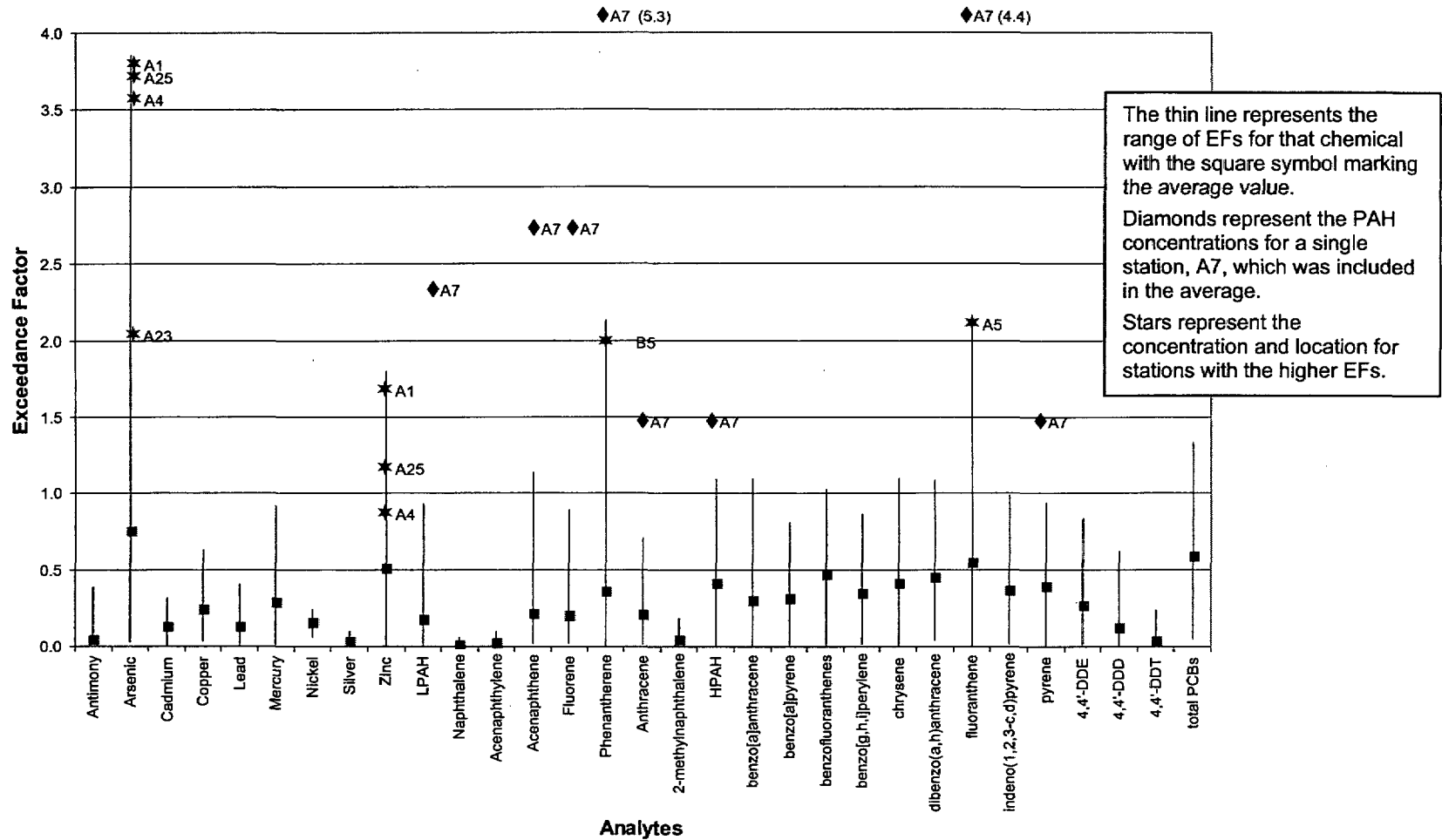
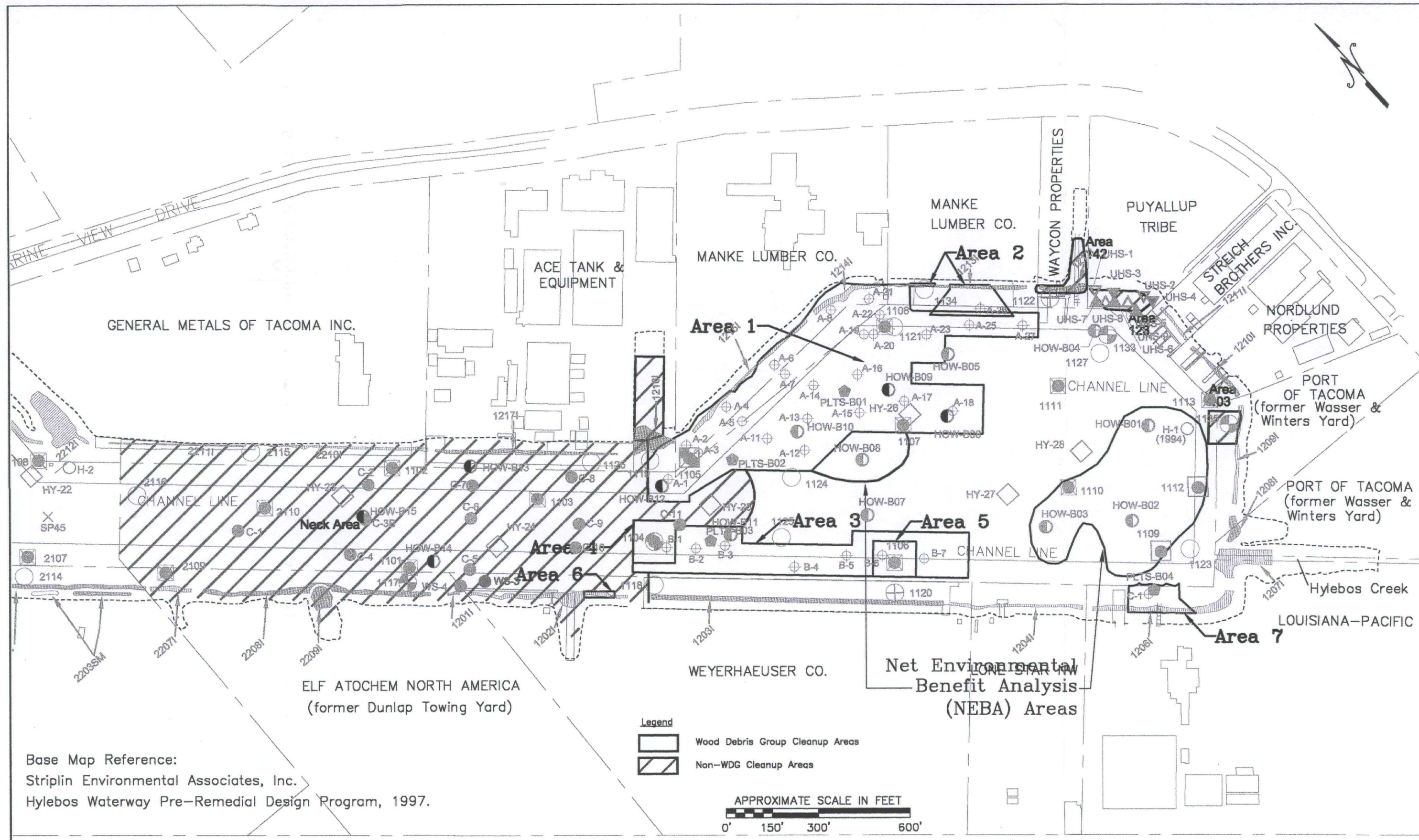
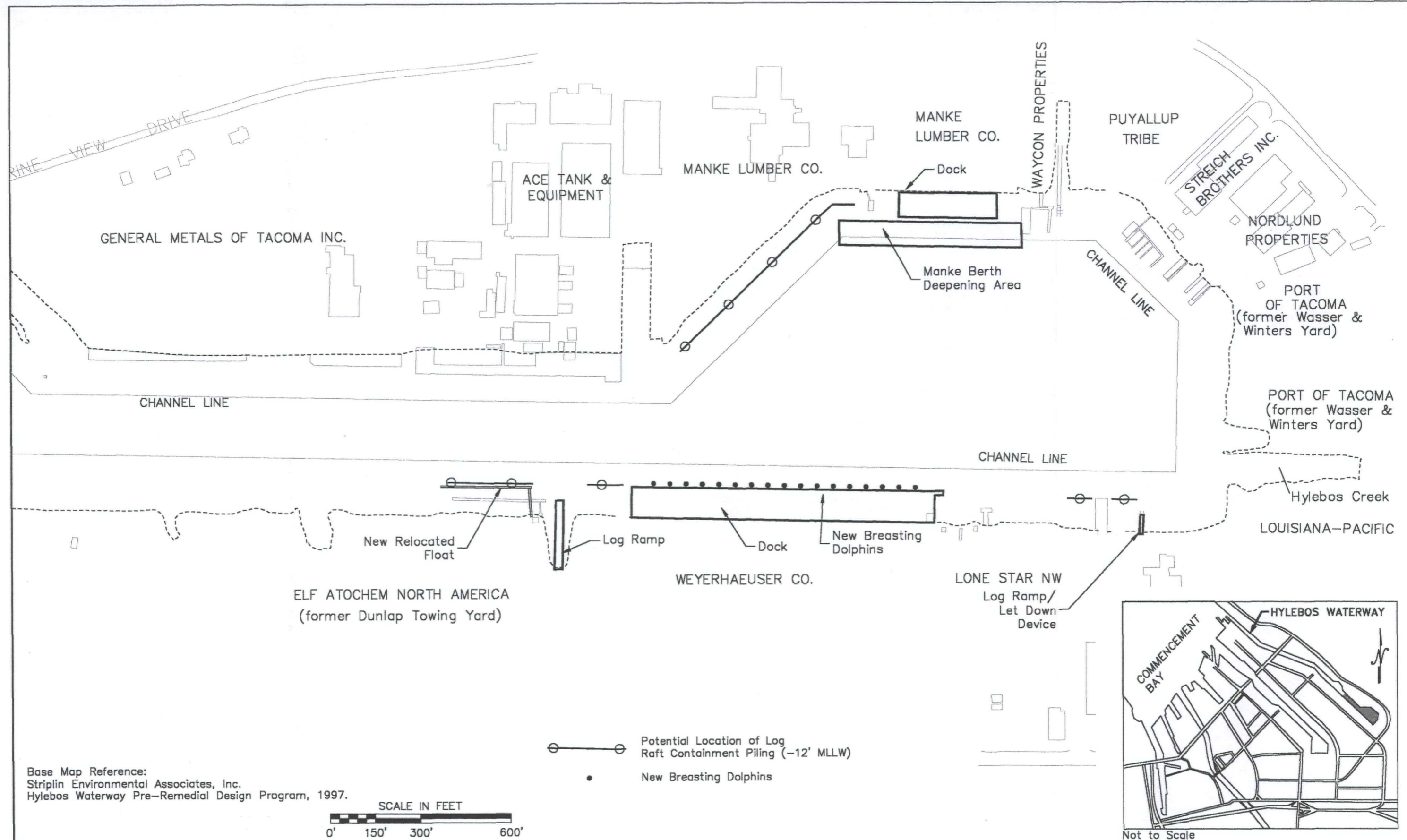


Figure 3.4
SQO Exceedances for PSDDA Analyses in WDG Cleanup Areas



NOTE: 1. PSDDA analyses performed in May and July 1999 by the Hylebos Wood Debris Group.
2. Averages and ranges were calculated using PSDDA data from the WDG Cleanup Areas





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Figure 6.1
Habitat Preservation and Protection
and Facility Modifications